Redox Practice Test Answer Key

1. What is the oxidation number of carbon in the hydrogen carbonate ion?
For HCO_3^{-1} it must be choice B. +4

2. Which of these would be an example of a NON-SPONTANEOUS redox?
All are spontaneous except choice C, the electrolysis of water

3. We lit magnesium metal on fire, and it converted to magnesium oxide.
Which of these shows the half oxidation reaction?
Oxidation = loss of electrons, shown only by choice A. $Mg \rightarrow Mg^{+2} + 2e^-$

4. In an electrolytic cell which is true:
only choice B. reduction happens at the cathode (true for all cells)

5. The salt bridge D. allows for the flow of ions

6. The electrode that loses mass is B. anode (cathodes get bigger)

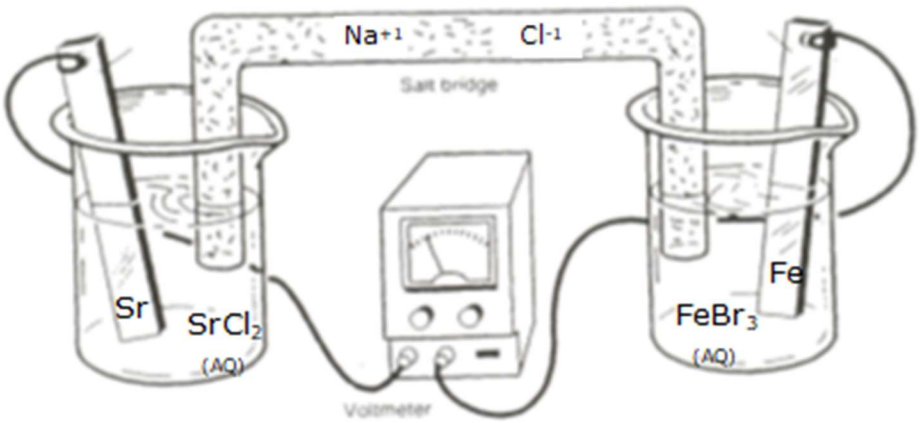
7. $Zn_{(S)} + HCl_{(AQ)} \rightarrow$ Which species is oxidized in this reaction?
A. Zn° gets oxidized into Zn^{+2} ions

8. Which is a reason that a battery would run out of "juice"?
D. they run out of anode, or run out of cathode cations, or run out of salt ions.

9. In this reaction is completed, which species is reduced?
$Ca + HCl \rightarrow ?$ B. H^+ ($2H^{+1}$ become $H_2°$)

10. Reduction happens at the cathode is true for C. voltaic and electrolytic cells (red-cat is always true)

11. The salt bridge in a voltaic cell must be A. aqueous (otherwise the ions could not flow)



14. Write the ½ reactions:

½ Ox: $Sr^{\circ} \rightarrow Sr^{+2} + 2e^{-}$ ½ Red: $Fe^{+3} + 3e^{-} \rightarrow Fe^{\circ}$

BALANCED ½ Ox: $3Sr^{\circ} \rightarrow 3Sr^{+2} + 6e^{-}$ ½ Red: $2Fe^{+3} + 6e^{-} \rightarrow 2Fe^{\circ}$

15. Net Ionic Equation: $3Sr^{\circ} + 2Fe^{+3} \rightarrow 3Sr^{+2} + 2Fe^{\circ}$

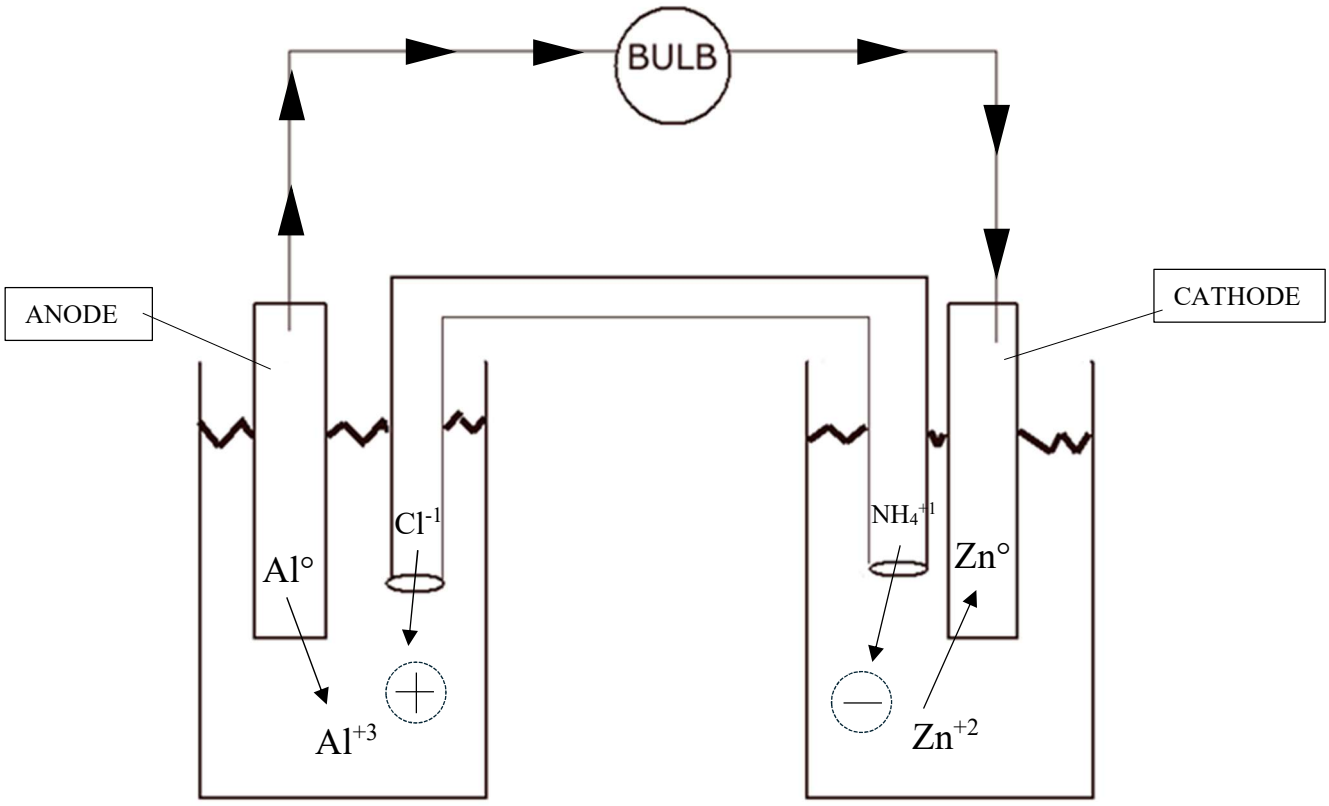
16. What is the reducing agent? Sr° What is the oxidizing agent? Fe^{+3}

17. Which electrode loses mass? The anode Sr. It goes into solution as Sr^{+2} ions.

18. This voltaic cell converts CHEMICAL ENERGY into ELECTRICAL ENERGY.

19. THE SALT BRIDGE ALLOWS IONS TO FLOW TO OFFSET THE CHARGES THE SOLUTIONS WOULD DEVELOP, WHICH WOULD STOP THE FLOW OF ELECTICITY.

Draw this in, then answer the questions. The salt bridge is ammonium chloride solution. At left is an aluminum bar in aluminum chloride solution. At right is a zinc bar in zinc nitrate solution. Fully label this voltaic cell, then show the half reactions and net ionic equation.



19. Which is the anode? A. Al aluminum is higher on table J

20. The NH_4^{+1} will move towards the beaker with the B. $Zn(NO_3)_{2(AQ)}$

21. The flow of electrons goes from A. Al to Zn (from anode to cathode)

22. This question has six choices... This reaction E. Both A and C (spontaneous and creates electric energy)

23. Reduction takes place at… D. the cathode which is zinc

24. The electrode that will lose mass will be the... A. the anode which is aluminum

25. In this redox reaction $4Al + 3O_2 \rightarrow 2Al_2O_3$ which species is oxidized? A. Al°, the atoms → Al^{+3} cations

26. In this reaction: $Zn^0 + Pb^{+2} \rightarrow Zn^{+2} + Pb^0$ which species is reduced? B. Pb^{+2} gains two electrons → Pb^0

27 & 28. An electrolytic cell converts <u>electrical</u> energy into <u>chemical</u> energy.

29 & 30. A voltaic cell converts <u>chemical</u> energy into <u>electrical</u> energy.